Small Satellite Proximity Operations Hardware-in-the-Loop Test Bed Development

Completed Technology Project (2014 - 2016)

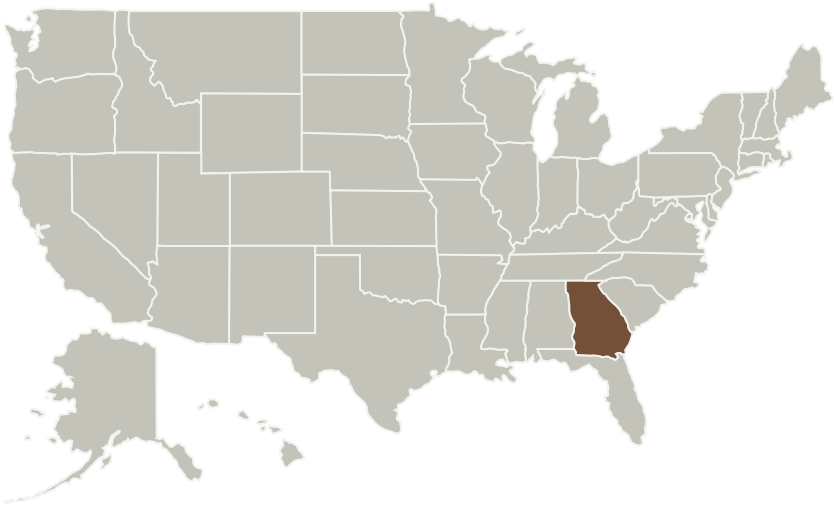
Project Introduction

With the proliferation of small satellites resulting from CubeSat standardization of flight hardware elements, new mission architectures involving automated small satellite proximity operations are increasingly relevant. While small satellite lifecycle costs are often tightly constrained, a rigorous program of requirement verification and validation during flight system integration and testing is needed to ensure successful performance during proximity operations. To meet this need, the proposed investigation will develop a test environment that combines high-fidelity software simulation with a hardware-in-the-loop test bed, for the validation of nano- and micro-satellite missions involving relative proximity operations. This system will provide an environment to test the integrated spacecraft through the entirety of the proximity operations portion of its mission, including the simulation of power production, visual stimuli, and attitude determination and control in response to the test environment. Development of a dedicated software simulation capability coupled with a hardware-in-the loop test bed will provide for a powerful facility aimed at the advancement of autonomous small satellite systems for proximity operations.

Anticipated Benefits

Development of a dedicated software simulation capability coupled with a hardware-in-the loop test bed will provide for a powerful facility aimed at the advancement of autonomous small satellite systems for proximity operations.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Responsible Program:

Space Technology Research Grants

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Organizations Performing Work	Role	Type	Location
Georgia Institute of Technology-Main Campus(GA Tech)	Supporting Organization	Academia	Atlanta, Georgia

Primary U.S. Work Locations
Georgia

Project Website:

https://www.nasa.gov/directorates/spacetech/home/index.html

Project Management

Program Director:
Claudia M Meyer

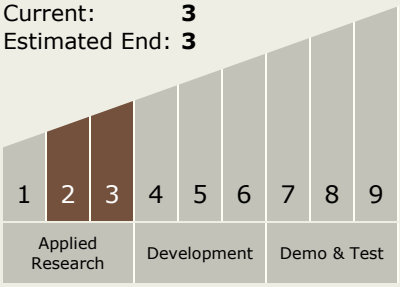
Program Manager:
Hung D Nguyen

Principal Investigator:
David A Spencer

Co-Investigator:
Sean B Chait

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- TX04 Robotic Systems
  - TX04.5 Autonomous Rendezvous and Docking
    - TX04.5.7 Modeling, Simulation, Analysis, and Test of Rendezvous, Proximity Operations, and Capture